

Exemption No. 5216

**UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
KANSAS CITY, MISSOURI 64106**

In the matter of the petition of

BEECH AIRCRAFT CORPORATION

Regulatory Docket No. 086CE

for an exemption from §§ 23.201(e), (f) (4) and (f) (5),
23.203 (c) (4) and (c)(5), 23.1545(b)(5) and (b)(6) of
the Federal Aviation Regulations

GRANT OF EXEMPTION

By letter dated June 1, 1990, Mr. W.H. Schultz, Division Manager Technical Service and FAA Liaison, Beech Aircraft Corporation, P.O. Box 85, Wichita, Kansas 67201-0085 petitioned for an exemption from §§ 23.201(e), (f)(4) and (f)(5), 23.203(c)(4) and (c)(5), and 23.1545(b)(5) and (b)(6) of the Federal Aviation Regulations (FAR) to permit type certification of the Beech Model 1900D commuter category airplane with certain stall characteristics and airspeed indicator markings that are appropriate to this category of aircraft.

Section of the FAR affected:

Section 23.201(e) requires that, during the recovery part of the stall maneuver, it must be possible to prevent more than 15 degrees of roll or yaw by the normal use of controls.

Section 23.201(f)(4) and (5) requires that compliance with § 23.201 must be shown with:

1. power or thrust off and at 75% maximum continuous power or thrust and
2. the airplane trimmed at $1.5 V_{S1}$ or at the minimum trim speed, whichever is higher.

Section 23.203(c)(4) and (5) requires that compliance with § 23.203 must be shown with 75 percent maximum continuous power and the airplane trimmed at $1.5 V_{S1}$ or at the minimum trim speed, whichever is higher.

Section 23.1545(b)(5) and (6) requires the following markings on the airspeed indicator:

1. For the one-engine inoperative best rate of climb speed, V_y , a blue sector extending from the V_y speed at sea level to the V_y speed at--
 - (a) An altitude of 5,000 feet, if the one-engine inoperative best rate of climb at the altitude is less than 100 feet per minute, or
 - (b) The highest 1,000 foot altitude at or above 5,000 feet at which the one-engine inoperative best rate of climb is 100 feet per minute or more.

Each side of the sector must be labeled to show the altitude for the corresponding V_Y .

2. For the minimum control speed (one-engine inoperative), V_{MC} , a red radial line.

The Petitioner's supportive information is as follows:

The model 1900D is being developed as a derivative of the model 1900 and will be type certified in the commuter category under Type Certificate A24CE. The certification basis of the 1900D is part 23, effective February 1, 1965, as amended by amendments 23-1 through 23-34; part 36 effective December 1, 1969, as amended by amendments 36-1 through the amendment effective at the time of type certification (TC); SFAR 27 effective February 1, 1974, as amended by amendments 27-1 through the amendment effective at time of TC. Exemption No. 5078 from § 23.207 (c) regarding stall warning has been previously granted for the model 1900D.

Beech Aircraft Corporation believes the requirements of §§ 23.201(e), (f)(4) and (f)(5), 23.203(c)(4) and (c)(5) are inappropriate to this category of aircraft. If required to comply with these sections, Beech believes significant design compromises must be made that will degrade the safety, performance and utility of this airplane and increase the development and operating costs.

Beech's request is based upon the requirement that the pilot of the model 1900D must be type rated. It is also based on the fact that the 1900D must be operated in accordance with scheduled performance, similar to part 25 requirements, which prohibits the operation of the airplane near the stall. In addition, should the pilot inadvertently operate the airplane below the scheduled airspeeds, an impending stall would be obvious to the crew because the low speeds of operation at high power produce very high pitch attitudes and very high rates of climb. These characteristics are similar to those of other high performance airplanes that are certified under part 25. Furthermore, the model 1900D stall warning system is designed to activate at no less than 5 knots above the actual stall in accordance with the provisions of Exemption No. 5078.

Beech states that commuter category performance requirements are similar to those of transport category. High thrust-to-weight ratios are required to meet the increased payloads and the high/hot day field performance that will satisfy the operational requirements of the commuter airlines. These high thrust-to-weight ratios, in turn, do not allow power on stalls to occur until very high flight deck angles and very low airspeeds are reached. Operating speeds in the part 23 commuter category also have become similar in definition to part 25 (in particular, V_1 , V_2 , V_{LOF} , V_R). However, for the commuter category, power-on stall characteristics must be demonstrated with 75% maximum continuous power, which is much higher than that required for the similar power-on stall characteristics demonstration for the transport category. The latter prescribes power-on stall demonstrations with the power necessary to maintain level flight at $1.6 V_{S1}$ (where V_{S1} corresponds to the stalling speed with flaps in the approach position, the landing gear retracted and maximum landing weight). For the model 1900D this power level would be approximately 48% maximum continuous power.

Beech states that in order to meet the increased payload and high/hot field performance requirements, the maximum takeoff power of the 1900D was increased to 1280 SHP compared to the 1100 SHP of the 1900C. This produces a 14% increase in power/weight ratio for the 1900D over the 1900C. During the power-on stall testing with the high powers required by §§ 23.201(f)(4) and 23.203(c)(4), pitch attitudes in excess of 30 degrees and airspeeds well below V_{MC} are experienced. In some cases, the indicated airspeed drops to zero. In consideration of the power induced rolling moments generated at low speed, the higher powers and the higher roll inertias associated with larger airplanes and the fuel imbalances that are required to be demonstrated, an increase in the maximum permissible roll angle from 15 degrees to 20 degrees during recovery is reasonable for commuter category airplane.

Beech asserts that, in order to comply with the requirements of §§ 23.201 and 23.203, a method to artificially control the angle of attack of the airplane would have to be developed. This would create a significant addition of complexity to the airplane. Because of the go/no go nature of such an addition, dispatch efficiency and operating costs would be adversely affected. Field performance would likely be increased by the requirements to artificially increase stall speeds. These factors all show up as increased costs to the operator and to passengers, which is not in the public interest.

Beech, therefore, proposes that the model 1900D be exempted from the requirements of §§ 23.201(e), (f)(4) and (f)(5); and, 23.203(c)(4) and (c)(5). In the public interest and to maintain safety, the airplane shall comply with the following requirements that are similar to those of part 25 for transport category airplanes:

Wings level stall.

1. During the recovery part of the maneuver, it must be possible to prevent more than approximately 20 degrees of roll by the normal use of controls.

2. Compliance with the requirements of this section must be shown under the following conditions:

(a) Power: Power or thrust off, and the power necessary to maintain level flight at $1.6 V_{S1}$ (where V_{S1} corresponds to the stalling speed with the flaps in the approach position, the landing gear retracted, and maximum landing weight).

(b) Trim: At a speed between $1.2 V_{S1}$ and $1.4 V_{S1}$.

Turning flight and accelerated stalls.

1. Compliance with the requirements of this section must be shown with:

(a) Power: The power necessary to maintain level flight at $1.6 V_{S1}$, (where V_{S1} , corresponds to the stalling speed with the flaps in the approach position, the landing gear retracted, and maximum landing weight), and

(b) Trim: At a speed between $1.2 V_{S1}$, and $1.4 V_{S1}$.

The petitioner states that the stall demonstrations, proposed instead of the current commuter category requirements, will provide a level of safety similar to that of transport category airplanes. The requirements as proposed will provide for lower flight attitudes at power-on stall conditions that are more appropriate for a commuter category airplane operating as a regional airliner.

Beech also requests that the model 1900D be exempted from including the blue line and red line markings on the airspeed indicator as required by § 23.1545(b)(5) and (6). For a commuter category airplane, the pilot is type rated and performance is scheduled using several defined and scheduled airspeeds (V_1 , V_2 , V_{LOF} , V_R). The scheduled performance and associated airspeeds are included in the AFM. The blue and red lines on the airspeed indicator required by the above regulations only serve to clutter the airspeed indicator and detract from the scheduled takeoff airspeeds. Removing these markings would allow proper crew focus on the appropriate takeoff airspeeds. This would promote safety and, therefore, be in the public interest.

Comments on published petition summary:

A summary of this petition was published in the FEDERAL REGISTER for public comment on July 12, 1990 (55 FR 28712). The comment period closed August 1, 1990. No comments were received.

The Federal Aviation Administration's (FAA) analysis is as follows:

To obtain the exemption, the petitioner must show, as required by § 11.25(b)(5), that: (1) granting the request is in the public interest, and (2) the exemption would not adversely affect safety, or that a level of safety will be provided that is equal to that provided by the rule from which the exemption is sought.

The FAA has carefully reviewed the information contained in the petitioner's request for exemption.

The FAA agrees that the requirements proposed by Beech, which are similar to transport category requirements, will provide for lower flight attitudes at power-on stall conditions. These flight attitudes are more appropriate for commuter category airplane operated by a type rated pilot and at scheduled airspeeds. The FAA also agrees that, in addition, should the pilot inadvertently operate the airplane below the scheduled airspeeds, an impending stall would be obvious to the crew because the low speeds of operation at high power produce very high pitch attitudes and very high rates of climb.

The FAA agrees that, since the scheduled performance and associated airspeeds are included in the AFM, the blue and red lines on the airspeed indicator only serve to clutter the airspeed indicator and detract from the scheduled takeoff airspeeds.

The FAA has evaluated each of the specific conditions proposed by the petitioner with respect to ensuring a level of safety equivalent to the requirement from which the exemption is sought. The FAA has concluded that, when compliance is shown with specific conditions set forth as limitations herein, the level of safety intended by §§ 23.201(e), (f)(4) and (f)(5); 23.203(c)(4) and (c)(5); and, 23.1545(b)(5) and (b)(6) will be achieved.

In consideration of the foregoing, I find that a grant of exemption is in the public interest and that it will not adversely affect safety. Therefore, pursuant to the authority contained in Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, as amended, delegated to me by the Administrator (14 CFR 11.53), Beech Aircraft Corporation is granted an exemption from §§ 23.201(e), (f)(4) and (f)(5); 23.203(c)(4) and (c)(5), and, 23.1545(b)(5) and (b)(6) of the Federal Aviation Regulations to the extent necessary to allow type certification of the Beech Model 1900D airplane without an exact showing of compliance with the requirements of the previously cited sections. For the Beech Model 1900D, this exemption is subject to the following conditions and limitations:

1. For the wings level stall, during the recovery part of the maneuver, it must be possible to prevent more than approximately 20 degrees of roll by the normal use of controls.
2. Compliance with the requirements of § 23.201 must be shown under the following conditions:
 - (a) Power: Power or thrust off, and power necessary to maintain level flight at $1.6 V_{S1}$, (where V_{S1} , corresponds to the stalling speed with the flaps in the approach position, the landing gear retracted, and maximum landing weight).
 - (b) Trim: At a speed between $1.2 V_{S1}$ and $1.4 V_{S1}$.

3. During turning flight and accelerated stalls, compliance with the requirements of § 23.203 must be shown with:

(a) Power: The power necessary to maintain level flight at $1.6 V_{S1}$ (where V_{S1} , corresponds to the stalling speed with the flaps in the approach position, the landing gear retracted, and maximum landing weight), and

(b) Trim: At a speed between $1.2 V_{S1}$, and $1.4 V_{S1}$.

Issued in Kansas City, Missouri on August 9, 1990.

/s/

Barry D. Clements,
Manager Small Airplane Directorate